

## REMARKS

Claims 1, 3, 5, 7-9, 13, 16, 20, and 28 are pending in the present Application. Claim 1 has been amended, no claims have been added, Claims 16 and 20 have been canceled, and claims 4, 6, 10-12, 14, 15, and 21-27 remain withdrawn, leaving claims 1, 3, 5, 7-9, 13, and 28 for consideration upon entry of the present Amendment.

### Amendments to Claims

Claim 1 has been amended to include the limitations of Claim 16, canceled herewith. Claim 1 has also been amended to include a limitation to the surface active material being a cathode material, support for which can be found at least in the Specification on p. 6, lines 10-11, and in Claim 18 as originally filed. Claim 20 has also been canceled.

No new matter has been entered by these amendments. Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

### Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-3, 5, 7-9, 13, 17, 17, and 20 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent Application Publication No. 2002/0114993 (“Miyaki”) in view of U.S. Patent No. 5,916,485 (“Besenhard”). Applicants respectfully traverse the rejection.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior art relied upon, or knowledge generally available in the art at the time of the invention, must provide some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). “A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). To find obviousness, the Examiner must “identify a reason that would have prompted a person of ordinary skill in the art in the relevant field to combine the

elements in the way the claimed new invention does.” *Id.*

Miyaki discloses a nonaqueous secondary battery containing a positive electrode and a negative electrode both containing a material capable of reversibly intercalating and disintercalating lithium, and wherein the positive and/or negative electrode have at least one protective layer thereon, a nonaqueous electrolyte, and a separator. Miyaki, Abstract.

Besenhard discloses a method for producing electrically conductive composites from predominantly non-conductive or poorly conductive substances through the application of substrate-induced coagulation. Besenhard, Abstract.

The instant claims claim a method of producing surface modified materials, specifically surface modified cathode materials for lithium batteries. Amended Claim 1 and its dependents are not obvious over Miyaki in view of Besenhard as the combination fails to teach all elements of the instant claims, and fails to provide a suggestion or incentive that would lead one skilled in the art to include the missing elements, with a reasonable expectation of success. Specifically, amended claim 1 requires “treating the resultant of step (ii) with heat at a temperature of more than about 550 °C”, and fails to teach the application of the method to TiO<sub>2</sub> or Al<sub>2</sub>O<sub>3</sub> as coating materials, and to LiCoO<sub>2</sub> as the bulk of material. Neither Miyaki nor Besenhard teaches or suggests this element.

As argued previously, Miyaki does not disclose or suggest the missing element, nor does the reference disclose a step that can be considered by an ordinary skill in the art to equate the step. No heating steps disclosed by Miyaki involve heating the particulate solid particles deposited on the flocculant-treated bulk (referred to as the “deposit”, a material produced by steps (i) and (ii) of Claim 1) at a temperature of more than about 550°C, as required by the instant claims. According to Miyaki, calcining, a high temperature process, is carried out to make the amorphous oxide composite used as the electrode:

The amorphous composite oxides used in the invention can be synthesized by either a calcining process or a solution process. A calcining process is more preferred. In a calcining process, oxides or compounds of the elements shown in formula (1) are mixed well and calcined to obtain an amorphous composite oxide. Calcining is carried out preferably at a rate of temperature rise of 5 to 200 °C/min, at a calcining temperature of 500 to 1500 °C. for a calcining time of 1 to 100

hours. The rate of temperature drop is preferably 2 to  $10^7$  °C/min.

Miyaki, paragraphs [0078] and [0079]. Or, for the synthesis of the positive electrode material:

The positive electrode active material can be synthesized by mixing a lithium compound and a transition metal compound(s), followed by calcining method or by solution reaction. The calcining process is particularly preferred. The calcining temperature is selected from the range in which a part of the mixed compounds may decompose or melt, for example, from 250 to 2000 °C., preferably from 350 to 1500 °C. Calcining is preferably preceded by calcination at 250 to 900 °C. The calcining time is preferably 1 to 72 hours, more preferably 2 to 20 hours. The mixing of the raw materials may be either dry blending or wet blending. The calcining may be followed by annealing at 200 to 900 °C.

Miyaki, paragraph [0429]. Or, for drying the assembled sheet, cylindrical or angular-shaped battery:

...In a sheet, cylindrical or angular-shaped battery, the positive or negative electrode material mixture is usually applied to a current collector, dried, and compressed. ... Drying or dehydration of the pellet or the sheet is conducted by a generally used means. Hot air drying, vacuum drying, infrared drying, far infrared drying, electron beam drying, and low humidity air drying can be employed either alone or in combination thereof. The drying temperature preferably ranges from 80 to 350 °C., particularly from 100 to 250 °C. It is preferable for cycle characteristics that the water content of each of the positive electrode material mixture, the negative electrode material mixture, and the electrolyte be not more than 500 ppm, giving the total battery water content of not more than 2000 ppm. ...

Miyaki, paragraphs [0459] and [0460].

Additionally, the drying of a sheet, cylindrical or angular-shaped battery is not the “treating the resultant of step (ii) with heat at a temperature of more than about 550°C” required by the amended claims, and would not be considered by an ordinary skill in the art to equate to the heating step. First, Miyaki teaches the drying of the assembled battery. Further, the disclosed temperature range according to Miyaki is from 80 to 350°C, well below the 550°C required by the instant claims. The temperature requirement “of more than about 550°C” is therefore not disclosed or suggested in Miyaki.

Nor does Besenhard teach or suggest the missing element. Neither the Examiner nor

Applicants can find that Besenhard discloses this element, nor is any disclosure found in Besenhard that can be considered by one of ordinary skill in the art to equate to this element. Besenhard therefore fails to remedy the deficiency of Miyaki. The two references, alone or in combination, therefore fail to disclose or suggest the element “treating the resultant of step (ii) with heat at a temperature of more than about 550°C” required by the amended claims.

Amended Claim 1 and its dependents further require the heat at a temperature of more than 550°C to create “a core-shell material with the core and the shell(s) being different distinct phases,” a structure that could not be formed under the conditions disclosed in Miyaki in view of Besenhard (e.g., at 350°C as discussed hereinabove). As argued previously, “core-shell” materials with the core and the shell being different phases can only be formed at a temperature of more than about 550°C, because a chemical reaction between the bulk material and the deposit to form one or more new phases can only happen at 550 °C or higher. See Specification, p. 7, lines 20-24; p. 11, lines 14-16. The Examiner has stated that these arguments are not commensurate with the scope of the claims. Applicants respectfully disagree with the Examiner, and wish to go on record as maintaining that the method disclosed in Claim 1, of providing a dopant gradient using the combination of bulk material and coating materials treated according to step (ii) of Claim 1 and as disclosed in the Specification is applicable to all bulk materials hitherto claimed in Claim 1 due to the physical property similarity of the bulks of material. Applicants, however, herewith amend Claim 1 without prejudice to limit to the bulk of material to  $\text{LiCoO}_2$ , and the coating particles to  $\text{TiO}_2$  or  $\text{Al}_2\text{O}_3$ , express support for which combinations is found in the instant Specification from p. 7, line 12, to p. 9, line 2, and in addition to the support therein (and in the Examples) for  $\text{TiO}_2$  as acknowledged by the Examiner, for use of  $\text{Al}_2\text{O}_3$  as disclosed therein to form a gradient coating, and as further exemplified in the Specification in Example 2 on pp. 14-15. Applicants respectfully request reconsideration of Claim 1 in view of these amendments as indicated by the Examiner in the Office Action.

Therefore, amended Claim 1 is not unpatentable over Miyaki in view of Besenhard since the combination fails to disclose or suggest all elements required by the present claims. Claims 3, 5, 7-9, 13, and 28 each depend directly or indirectly from Claim 1 and therefore are

also not unpatentable over the combination of cited references, and should be allowable.

Reconsideration and withdrawal of the rejections, and allowance of the claims, are respectfully requested.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance are requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

CANTOR COLBURN LLP

By: /Dana A. Gronbeck/  
Dana A. Gronbeck  
Registration No. 55,226  
Confirmation No. 1932  
CANTOR COLBURN LLP  
20 Church Street, 22<sup>nd</sup> Floor  
Hartford, CT 06103  
Telephone (860) 286-2929  
Facsimile (860) 286-0115  
Customer No.: 23413

Date: May 15, 2008